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Investigation of the dynamics of ephemeral gully erosion on arable land of the forest-steppe and steppe zone of the East of the Russian Plain from remote sensing data

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Abstract

© Published under licence by IOP Publishing Ltd. Spatio-temporal estimation of the erosion of arable soils is still an urgent task, in spite of the numerous methods of such assessments. Development of information technologies, the emergence of high and ultra-high resolution images allows reliable identification of linear forms of erosion to determine its dynamics on arable land. The study drew attention to the dynamics of the most active erosion unit - an ephemeral gully. The estimation of the dynamics was carried out on the basis of different space images for the maximum possible period (from 1986 to 2016). The cartographic method was used as the main research method. Identification of a belt of ephemeral gully erosion based on materials of multi-zone space surveys and GIS-technology of their processing was carried out. In the course of work with satellite imagery and subsequent verification of the received data on the ground, the main signs of deciphering the ephemeral gully network were determined. A methodology for geoinformation mapping of the dynamics of ephemeral gully erosion belt was developed and a system of indicators quantitatively characterizing its development on arable slopes was proposed. The evaluation of the current ephemeral gully network based on the interpretation of space images includes the definition of such indicators of ephemeral gully erosion as the density of the ephemeral gully net, the density of the ephemeral gullies, the area and linear dynamics of the ephemeral gully network. Preliminary results of the assessment of the dynamics of the belt erosion showed an increase in all quantitative indicators of ephemeral gully erosion for the observed period.

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References

[1] Labutina I A 2004 Deshifrirovanie aerokosmicheskih snimkov (Aspect Press) 184
[2] Desprats J F, Raclot D, Rousseau M, Cerdan O, Garcin M, Le Bissonnais Y, Ben Slimane A, Fouche J and Monfort-Climent D 2013 Land Degradation & Development 22 32
[3] Vrieling A 2006 Catena 22 18
[4] Yermolaev O P 2002 Erosiya v basseinovih geosystemah (Unipress KGU) 265
[5] Yermolaev O P 2017 Geoinformation Mapping of Soil Erosion in the Middle Volga Region Eurasian Soil Science 50 118-131
[6] Govers G 1991 Rill erosion on arable land in Central Belgium: Rates, controls and predictability Catena 18 155
[7] Mekuriaw A, Heinimann A, Zeleke G, Hurni H and Hurni K 2017 Journal of Geographical Sciences 27 79-94
[8] Saadat H, Adamowski J, Tayefi V, Namdar M, Sharifi F and Ale-Ebrahim S 2014 Catena 113 313

[9] Van Lynden GWJ and Mantel S 2001 International Journal of Applied Earth Observation and Geoinformation 3 61-68
[10] Hoffmann E and Winde F 2010 Water SA 36 53-68
[11] Boardman J 2016 Catena 143 127
[12] Casalí J, López J and Giráldez J 1999 Catena 36 84
[13] Nachtergaele J and Poesen J 1999 Earth Surface Processes and Landforms 24 693-706
[14] Wang L, Huang J, Du Y, Hu Y and Han P 2013 Remote Sens 5 3848
[15] Alatorre L. 2009 Catena 76 190
[16] King C, Baghdadi N, Lecomte V and Cerdan O 2005 Catena 62 93
[17] Floras S and Sgouras I D 1999 International Journal of Applied Earth Observation and Geoinformation 1 68-77
[18] Liberti M, Simoniello T, Carone M, Coppola R, D'Emilio M and Macchiato M 2009 Geomorphology 106 343
[19] Zhang Y 2007 Soil and Tillage research 96 41